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THE STRIDULATORY MECHANISM OF *NERTHRA* SAY, A NEW SPECIES, AND SYNONYMY (HETEROPTERA: GELASTOCORIDAE)

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Abstract.—A stridulatory mechanism is recognized for the first time for the genus *Nerthra* Say, located in the male genital capsule of all species studied. *Nerthra toddi* NEW SPECIES replaces *Nerthra mexicana,* Todd 1955 (nec Melin, 1929). It is compared with *Nerthra mexicana* (Melin) (=*Nerthra usingeri* Todd, NEW SYNONYMY), with which it has been confused, *Nerthra martini* Todd, and *Nerthra stygica* Say. *N. martini, N. mexicana* and *N. toddi* all occur in Mexico, but are not known to be sympatric.

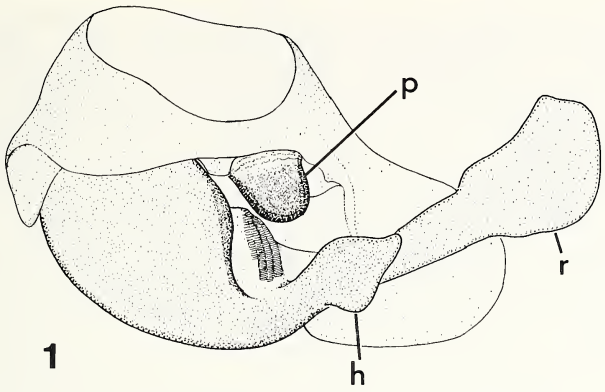
Key Words: Insecta, Heteroptera, stridulation, Gelastocoridae, new species, synonymy.

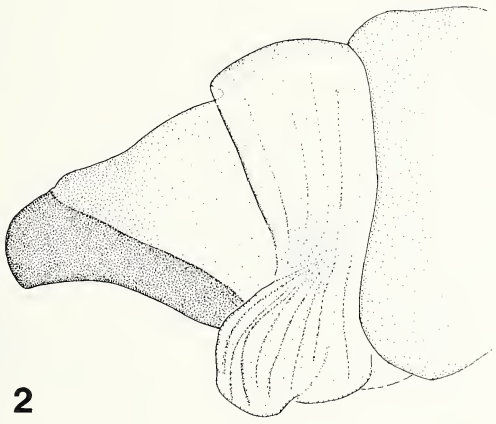
During the course of independent investigations on the genus *Nerthra,* the authors concurrently discovered that apparently all species of the genus *Nerthra* have an unrecognized stridulatory mechanism in the male genital complex (Figs. 1, 2), which is described and discussed below. The orientation and microsculpturing of the stridulitrum varies among species, and may provide a key character for species groups separated on the basis of this and other characters. A detailed examination of the genitalia of all 87 *Nerthra* species, known from all warm regions of the world except southern Europe, will be required to address this question, a task beyond the scope of this paper.

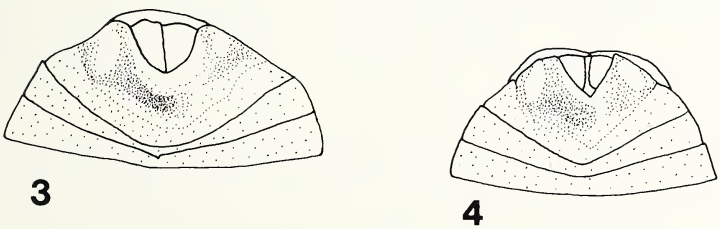
While investigating the morphology of *Nerthra* species, one of us (PL) noticed that the syntypes of *Nerthra mexicana* (Melin) are conspecific with *Nerthra usingeri* Todd. Todd (1955) said that the females of *mexicana* and *usingeri* were separable only by distribution, however both of us have now studied Melin's type of *mexicana,* a series of *usingeri,* and the species Todd described as *mexicana* (the latter two based primarily on male characters) and find that both males and females are clearly separable. Below we propose the name *Nerthra toddi* new species to replace *Nerthra mexicana,* Todd (nec Melin), and consequently *Nerthra usingeri* Todd 1954 must fall as a junior synonym of *Nerthra mexicana* (Melin) 1929.

Nerthra toddi, new species
Figs. 4, 6, 9, 12–14

Nerthra mexicana, Todd, 1955, nec Melin, 1929. Univ. Kansas Sci. Bull. 37:356–357, figs. 43, 94. (in part)
Nerthra mexicana, Todd, 1957. Proc. Ent. Soc. Wash. 59:149
Nerthra mexicana, Todd, 1961. Proc. Hawaiian Ent. Soc. 17:470.
Nerthra mexicana, Polhemus, 1972. Proc. Ent. Soc. Wash. 74:309.







Figs. 1, 2. *Nerthra* spp., male abdominal terminalia, showing stridulatory mechanism. 1. *N. mexicana* (Melin), genital segments; stridulitrum, four longitudinal striate rows. 2. *N. fuscipes* (Guerin), proctiger, right lateral view; plectrum, sclerotized posteroventral rim of proctiger. Legend: proctiger, p; right paramere, r; hypandria, h.

Figs. 3, 4. *Nerthra* spp., female abdominal terminalia, ventral view. 3. *N. mexicana* (Melin). 4. *N. toddi,* n. sp.

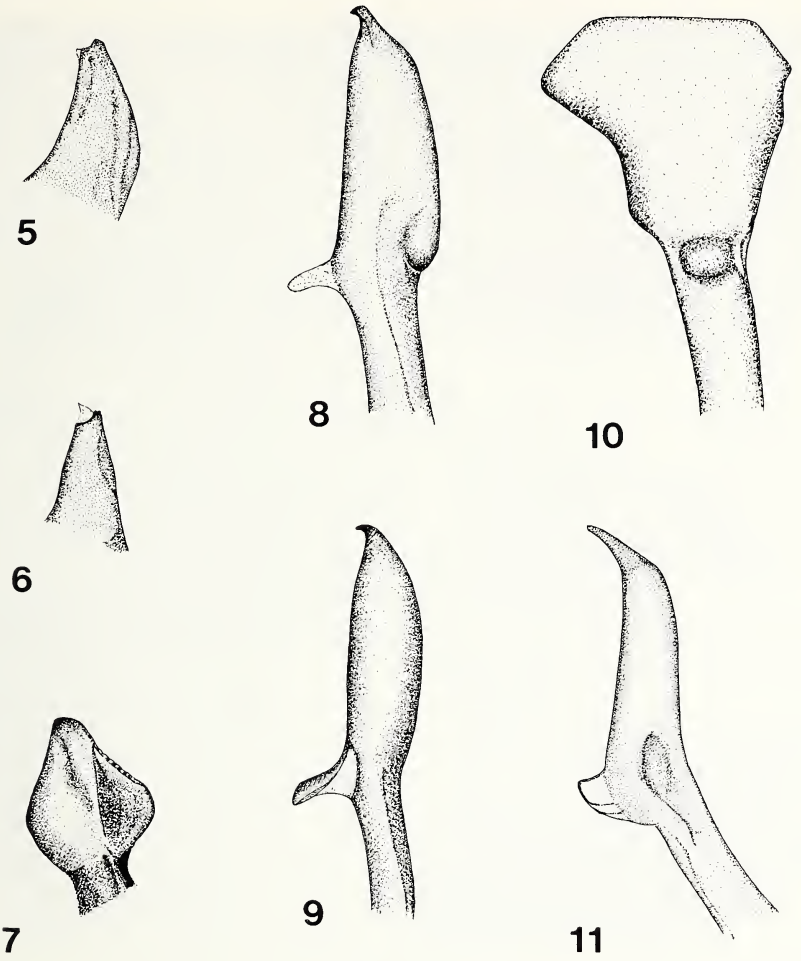
Redescription (all measurements in mm).—Coloration: Ground color light brown to blackish brown; darker specimens with most of frons brown, posterior lobe of pronotum with seven yellowish brown fascia; scutellum medially brownish in darker specimens, hemelytra mottled with yellowish brown; posterior third of each connexival segment yellowish. Venter mostly dark brown, mottled with yellowish brown; genital segments mostly yellowish. Legs yellowish, annulated with brown. Structural characteristics: Male, length 6.30–7.67 mm, width of pronotum 4.38–4.93 mm; width of abdomen 4.38–5.07 mm. Female, length 6.17–6.44 mm; width of pronotum 3.97–4.52 mm; width of abdomen 3.84–4.52 mm. Head anteriorly with three small apical tubercles, two superapical tubercles and two or three marginal tubercles on each side, the latter about equal in size, and several small tubercles on frons in longitudinal row; slight excavation between eye and lateral tubercles; ocelli present. Pronotum widest at level of the transverse furrow, about equal to width of abdomen; lateral margins straight medially, convergent on anterior third and posterior sixth; posterior margin sinuate. Scutellum wider (2.06) than long (1.51), depressed at basal angles, with a weak tumescence on each side of midline. Hemelytra extending beyond apex of abdomen; membrane broad, prominent; lateral margin of embolium slightly curved, faintly sinuate, not expanded. Connexiva thinly exposed in males; thinly to broadly exposed in females. Abdominal sternites of female asymmetrical, 6 and 7 fused but demarcated by a weak suture line; sternite 7 with shallow transverse depression on left side of midline, with adjacent strong lateral tumescence near left margin, and another smaller depression on right side anterad of small tumescence near right posterior margin (Fig. 4). Male hypandria distally as shown in Figure 6; right paramere elongate, with stout lateral spur near middle (Fig. 9).

Diagnosis.—*Nerthra toddi,* n. sp. belongs to the *stygica* group, established by Todd (1955:346), which includes, in addition to *toddi, martini* Todd, *mexicana* (Melin) and *stygica* Say. *N. toddi* can be most easily separated from the closely related *N. mexicana* (Melin) by the differently shaped male hypandria (Figs. 6, 7) and right parameres (Figs. 9, 10) and differently shaped female segments 5–7 (Figs. 3, 4). In females of *toddi* the depression on the left side of sternite 7 is much shorter and shallower and the adjacent tumescence is larger than in *N. mexicana* (Melin).

N. toddi can be separated from *N. martini* Todd by differences in the male hypandria (Figs. 5, 7) and right parameres (Figs. 8, 9), and differently shaped female segments 5–7 as illustrated by Menke (1979). Females of *martini* have the posterior margin of sternites 6 and 7 more V-shaped than in *toddi.* The geographic range of these two species is widely separated, as *martini* occurs primarily in California, southern Nevada and southern Arizona and barely ranges into Mexico (Polhemus 1972), whereas *toddi* is known only from eastern and southern Mexico.

N. toddi is easily separated from *N. stygica* Say by the coriaceous and fused hemelytra of the latter; the other species of the group have normal wings with a distinct membrane. There are also slight differences in the male genitalia (Fig. 11), and differently shaped female segments 5–7 as illustrated by Todd (1955). In females of *stygica* the posterior margin of sternite 7 is much more V-shaped than in *toddi.*

Type-material.—Holotype, male: MEXICO. **Chiapas**: Rio Sesecapa, CL 1248, XII-19-1969, J. T. Polhemus (USNM). Paratypes as follows: **Chiapas**: 1 female, same data as holotype; 1 female, Puente la Flor, CL 1247, XII-19-1969, J. T. Polhemus (JTPC). **Mexico**: 3 males, 3 females, Tejupilco, Dist of Temascaltepec, Alt 1,340 m,



Figs. 5–11. *Nerthra* spp., distal parts of right male parameres and hypandria. 5–7. Hypandria. 5. *N. martini* Todd. 6. *N. toddi,* n. sp. 7. *N. mexicana* (Melin). 8–11. Parameres. 8. *N. martini* Todd. 9. *N. toddi,* n. sp. 10. *N. mexicana* (Melin). 11. *N. stygica* Say.

VI-VII-1933, H. E. Hinton (SEMK, JTPC). **Oaxaca**: 1 female, 1 nymph, Tequisistlan, CL 1066, IV-30-1964, J. T. and M. S. Polhemus (JTPC). **San Luis Potosi**: 1 male, 2 nymphs, El Salto, VI-19-53, Univ. Kans. Mex. Exp. (SEMK). **Tamaulipas**: 1 male, 14 mi E of Tamazunchale, CL 526, I-8-1971, J. T. and M. S. Polhemus (JTPC); 1 male, 1 female, 5 mi N of Tamazunchale, stop 76, XII-22-1948, H. B. Leech (CAS, JTPC).

Discussion.—In the mixed series of "*mexicana*" described by Todd (1955), it appears that only the female paralectotype (apparently the female shown in fig. 94 of his monograph) belongs to *mexicana* (Melin) which is the same as his *usingeri*;

the others consist of a series of three males and three females that are named as paratypes of the new species *toddi* described above. Todd's description is quite adequate except for the female, which is figured here (Fig. 4) and compared to the true *mexicana* (Fig. 3). Females of the two species may be separated by the deeper, longer depression on the left side of sternum 7 of *mexicana*. The males are easily separated by the differently shaped right male parameres as shown by Todd (1955: figs. 43, 141) and our Figures 9 and 10.

Nerthra mexicana (Melin)
Figs. 1, 3, 7, 10

Mononyx mexicanus Melin, 1929. Zoologiska Bidrag Från Uppsala, 12:187–188, figs. 80–83. Lectotype, male, here designated, Mexico, Salle, in Stockholm Museum.

Nerthra usingeri, Todd, 1954. Pan-Pac. Entomol. 30:116–117, fig. 2. **NEW SYNONYMY.**

Nerthra mexicana, Todd, 1955. Univ. Kansas Sci. Bull. 37:356–357. (in part)

Nerthra usingeri, Todd, 1955. Univ. Kansas Sci. Bull. 37:360–362.

Nerthra usingeri, Todd, 1961. Proc. Hawaiian Entomol. Soc. 17:474.

Nerthra usingeri, Todd, 1978. Proc. Entomol. Soc. Wash. 80:313.

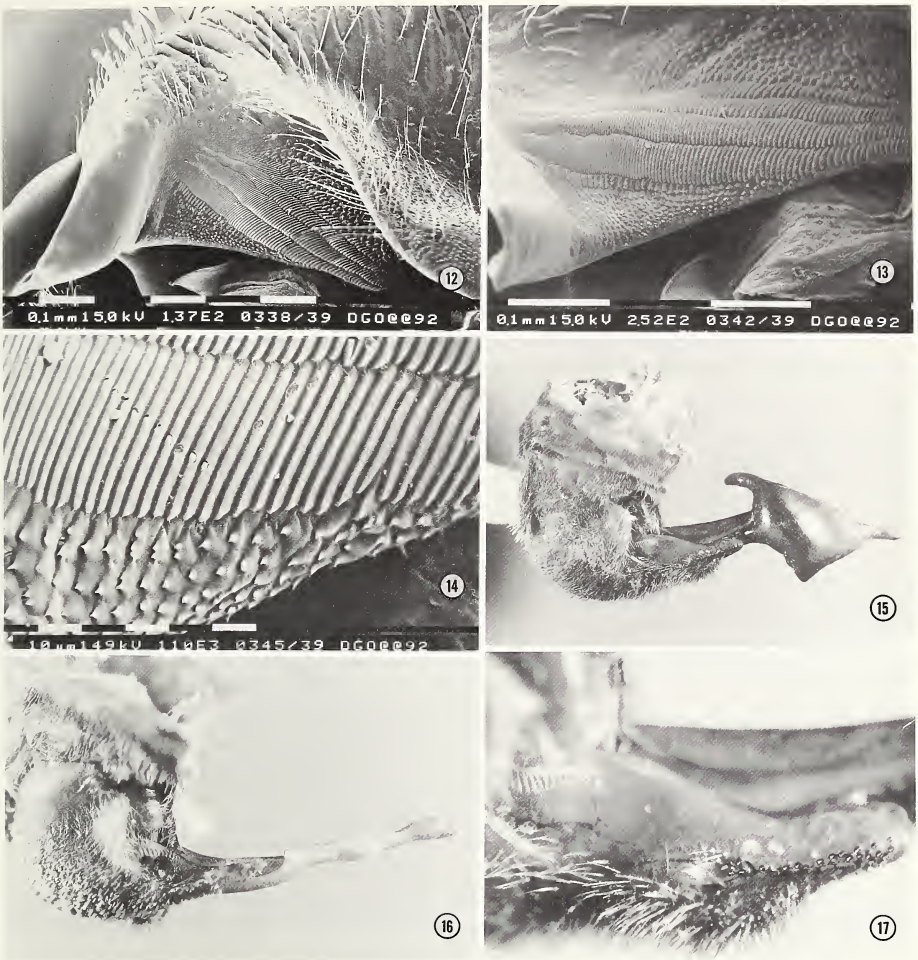
Material examined.—UNITED STATES: California: **San Bernardino Co.:** 1 male (holotype of *Nerthra usingeri*), Nr. Parker Dam. IV-12-52, R. L. Usinger (CAS); 1 female (allotype of *Nerthra usingeri*), 3.5 mi N Cross Roads, IV-12-52, J. D. Lattin (CAS); 1 male, 2 females (paratypes of *Nerthra usingeri*), same data (UCB, JTPC); 2 females, 10 mi NE Earp, I-26-57, Menke & Stange (SEMK). MEXICO: **Jalisco:** 1 female, Atentique, XII-5-48, E. S. Ross (JTPC); 3 males, 11 females, 9 nymphs, Rio Tomatlan, CL 736, VI-9-1975, J. T. Polhemus (JTPC). **State unknown:** 2 males (lectotype, paralectotype), 1 female (paralectotype), Salle (SMNH).

Discussion.—Todd (1955) noted that the syntype series of *Mononyx mexicana* (Melin) consisted of three specimens; he apparently studied only one female, which he refers to as the type, however as it did not have a lectotype designation it was only a syntype. We have before us three syntypes, two males and female, and here designate one male as lectotype, and the others as paralectotypes.

For comparative notes, see discussion under *N. toddi,* n. sp.

It is indeed curious that *N. mexicana* has a disjunct distribution bisected by that of *N. martini. N. mexicana* is known in the United States only from one locality along the Colorado River at low elevation (ca. 100 masl.) about 400 km from the delta at the head of the Sea of Cortez, and in Mexico is definitely recorded only from two localities in the state of Jalisco, both near the sea (see above, and Todd, 1978). *N. martini* is known mainly from mountain canyons (although it occurs in the Los Angeles basin, CA) and inland localities at moderate elevations, so would seem to be slightly more cold adapted than *mexicana.* The samples are not yet numerous enough to draw definite zoogeographical conclusions, but the few we have suggest both ecological and altitudinal habitat partioning.

Stridulatory mechanism.—All species studied of the genus *Nerthra* possess a stridulatory mechanism in the male genital capsule. The mechanism consists of a rastrate area on a dorsally oriented portion of the sternum of abdominal segment 9 (genital



Figs. 12–17. *Nerthra* spp., male abdominal terminalia, showing stridulatory mechanisms. 12–14. SEM photographs of *N. toddi,* n. sp., dorsally oriented part of tergum IX, showing stridulitrum. 15–17. Photomicrographs of *Nerthra* spp., showing transversely oriented striate rows of stridulitrum. 15, 17. *N. hamata* Todd. 16. *N. mixta* (Montandon).

capsule) (Figs. 1, 12–17) and the sclerotized posterior margin of the cup-shaped segment X (proctiger or anal cone, Figs. 1, 2). The proctiger is attached to segment IX by thick membranes surrounding the base, permitting considerable longitudinal movement. In dissected specimens muscles or tendons can be pulled with fine forceps to create a downward pressure and longitudinal movement of the posterior edge of the proctiger on the rastrate region. The muscles associated with the proctiger are apparently attached to the base of the proctiger and extend anteroventrally to the anterior margin of the ninth sternum (Keffer, in litt.). No stridulatory mechanism has been found in females.

The stridulatory mechanism is quite stable within species groups, but differs somewhat between groups. In *Nerthra mexicana* (Fig. 1), *N. toddi,* n. sp. (Figs. 12–14), *N. fuscipes* (Guerin) and many other New World species, as well as the Afrotropical–SE Asian *grandicollis* group, the striate rows are oriented longitudinally, whereas in *N. femoralis* (Montandon) from Australia, *N. mixta* (Montandon) (Fig. 16) and *N. hamata* Todd (Figs. 15, 17) from New Guinea, as well as most of the other species of the Melanesian region, the striate rows are more transverse. Whether or not the genus *Nerthra* should be divided into several genera, based on differences in somatic characters as well as the morphology of the stridulatory mechanisms, is a question that will be addressed in a future work. Should it be necessary to divide the genus, six generic names are available, all now in synonymy with *Nerthra.*

Sound produced by stridulation in these bugs has never been heard by humans to our knowledge. It is possible that stridulation occurs during copulation when the paramere and hypandrium are connected to the female, providing vibration stimulus. This modality has been hypothesized by Eberhard (1985:164–165) for moths and wasps having apparent stridulatory structures in the male genitalia.

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